

SOIL CONSERVATION SERVICE

WEST VIRGINIA

ENGINEERING STANDARD

POND SEALING OR LINING (No.)
Cationic Emulsion-Waterborne Sealant

Definition

Installing a fixed lining of impervious material or treating the soil in a pond mechanically or chemically to impede or prevent excess water loss.

Scope

This standard applies to the sealing of ponds with cationic emulsion sealant materials.

Purpose

To reduce seepage losses in ponds to an acceptable level and preserve or improve water quality.

Conditions Where Practice Applies

Where water loss from a pond through leakage is or will be of such proportion as to prevent the pond from fulfilling its planned purpose. This practice also applies where leakage will damage land and crops, cause waste of water or environmental problems.

This practice may be used where a seepage reduction of 70 to 95 percent adequately solve the leakage problem.

Design Criteria

The design shall be based on adequate investigation and documentation of the leaking soil materials.

Ponds to be sealed shall be constructed to meet SCS standards for irrigation pits or regulating reservoirs (552), irrigation storage reservoirs (436), ponds (378), waste treatment lagoons (359), waste storage ponds (425), or wildlife watering facilities (648), as appropriate.

Soil Properties

For electrochemical sealing, soils (in the surface 2 inches) shall have properties approximating the USDA textural soil classification for

1. Very fine sands, fine sands, medium sands, coarse sands, and very coarse sands.
2. Nonexpansive loamy sands and sandy loams.

Where the soil is relatively uniform throughout the entire pond, the seepage rate before sealing should exceed 1 foot per day, measured vertically. Where isolated sections within an area are suspected to cause most of the seepage loss, the seepage rate in these areas before sealing should exceed 1 foot per day.

Rate of Application

The minimum rate of application shall be based on small scale field tests with infiltration cylinders unless sufficient data are available on the field performance of previously tested soils that are similar, texturally and chemically, to the soil to be sealed.

In the absence of field test results on the soils to be sealed, the minimum application shall be 1 gallon per square yard.

Plans and Specifications

Plans and specifications for sealing ponds with a cationic emulsion-waterborne sealant shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

Operation and Maintenance

An operation and maintenance plan shall be prepared which includes, as a minimum, the following items:

1. Treated areas shall be protected from puncture by animal trampling.
2. Plant growth which would penetrate the treated surface shall be controlled.
3. Areas near normal waterline and at points of concentrated surface inflow shall be protected against erosion.
4. Any area where the sealant has been damaged shall be repaired immediately.
5. The pond shall be used in such a way that prevents removal or penetration of the sealant layer.
6. Sediment coagulating chemicals such as gypsum or iron sulfate should not be used to clear the water after the cationic sealant is installed.
7. Consistent with the purpose, the pond should be maintained at full pool after treatment to prevent weed growth, surface drying, and weathering damage to the treated surface.

MATERIAL SPECIFICATIONPOND SEALING OR LINING
Cationic Emulsion-Waterborne Sealant

The sealant should be a stable o/w emulsion of suitable bituminous, resinous, or polymeric bases, having infinite dilutability and good stability after dilution in all fresh waters of any native hardness. (The emulsion must be infinitely dilutable in the water to be treated without causing the asphalt to break.) Air and water temperature should be above 40°F. and discrete sealant droplets should be able to coalesce at 40°F. or above as they deposit on underlying soil.

The sealant must conform to the following applicable ASTM specifications and testing procedures:

ASTM 0-2397

(to be used in part as applicable to soil sealant)

	<u>Cationic Soil Sealant</u>	
	Minimum	Maximum
Viscosity (Saybolt Furol), 122°F. (50°C.), sec.	20	100
Settlement, 5 days, percent		
Particle Charge Test	Positive	
Sieve Test, Percent		-0.10
*Distillation:		
Oil Distillate, by volume of emulsion, percent		3
Residue, percent	60	
Test on Distillation Residue:		
Penetration, 77°F (25°C.), 100 g, 5 sec.	100	200
Ductility, 77°F (25°C.), cm	40	
Soluble in carbon disulfide, percent	98	

*(Evaporation test may be used in place of distillation for percent residue and penetration)

Testing Procedures

Viscosity	ASTM D-244
Settlement	ASTM D-244
Particle Charge	ASTM D-244
Sieve	ASTM D-244
Distillation	ASTM D-244
Evaporation	ASTM D-244
Penetration	ASTM D-5
Ductility	ASTM D-113
Solubility	

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Planning Considerations for water quantity and quality

Quantity

1. Effects upon components of the water budget, especially effects on volumes and rates of runoff, infiltration, evaporation, transpiration, deep percolation, and ground water recharge.
2. Variability of the practice's effects caused by seasonal or climatic changes.
3. Effects on downstream flows or aquifers that would affect other water uses or users.
4. Effects on the volume of downstream flow to prohibit undesirable environmental, social or economic effects.
5. Potential use for water management to conserve water.

Quality

1. Effects on the movement of sediment, pathogens, and soluble substances carried by seepage water.
2. Effects of this practice on the trapping of nutrients and pesticides and altering their effect on surface and ground water quality.
3. Effects on the visual quality of the pool and downstream water resources.
4. Short-term and construction-related effects on the quality of the pool and downstream water.
5. Effects of water level control on the salinity of soils, soil water, or downstream water.
6. Effects of water level control on the temperatures of downstream waters to prevent undesired effects on aquatic and wildlife communities.
7. Effects on wetlands or water-related wildlife habitats.